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# A rare case of isolated colon malrotation with chronic intermittent occlusion of the small bowel

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**Abstract**
The incidence of digestive malrotation is very frequent and represents about 1/500 births. Their incidence of discovery on imaging is 0.5%. Isolated malrotation of the colon is rarer than that of the small intestine alone or both in association.
We report here a rare case of isolated malrotation of the colon following an anomaly of the position of the inferior mesenteric artery associated with a chronic intermittent small bowel obstruction. These abnormalities were discovered on Upper Gastrointestinal Imaging, opaque enema and ultrasonography, performed in the Radiology Department of the University Hospital Center Analankininina Toamasina Madagascar.

**Keywords:** colon, inferior mesenteric artery, intestinal malrotation, small bowel, opaque enema, upper gastrointestinal imaging, ultrasonography

## Introduction

Digestive malrotation is defined as the failure of the gastrointestinal tract from the duodenum to the colon to settle normally. There is a continuum of gastrointestinal tract rotation abnormalities ranging from complete common mesentery without rotation, to incomplete common mesentery with interrupted rotation in its course [1]. Isolated malrotation of the colon is rarer than that of the small intestine alone or both in combination [2].

Chronic small bowel obstruction is a rare entity in current practice. The acute form is a surgical emergency [3].

In this article, we report a case of isolated colon malrotation associated with chronic intermittent small bowel obstruction.

## Deferred case

It was a 6-year-old boy, only son, presenting since the age of 3 years of diffuse abdominal pain, paroxysmal, sometimes followed by loss of consciousness for about 15 minutes, when the child was too full, accompanied by food vomiting. This really worried the parents and led them to consult a doctor.

He also had chronic constipation, with one bowel movement per week.

The child was small and skinny weighing 15 kilos for 1.10 meters.

On clinical examination, the abdomen was slightly distended, tender to palpation.

No other associated symptoms were found including no fever.

Biological exploration for an inflammatory workup revealed a slight anemia without any other associated abnormality.

The child was referred to our department for special examinations including an upper gastrointestinal transit (UGD) and an opaque enema for suspected digestive malrotation. We completed the examination with a Doppler ultrasonography of the mesenteric vessels.

The child did not vomit or lose consciousness during all the examinations.

On UGD, Treitz's angle was to the right of the spine and gastro-duodenal distension is noted. The small intestines were opacified and in a medial position (Figure 1).

The opaque enema showed a positional anomaly of the colonic frame

- The sigmoid colon had a rightward direction and the descending colon was in projection from the right lumbar fossa (Figure 2).
- The left colonic angle was located in projection on the right flank
- The transverse colon had two loops, a sinuous first part and a second part in a transverse position (Figure 3).
- The right colonic angle was located in projection of the left hypochondrium.
- The right colon was in a transverse position, with the cecum visible in subhepatic projection, located behind the left colonic angle (Figure 4).

On Doppler ultrasonography of the mesenteric vessels, there was no abnormality in the position of the superior mesenteric vessels. The inferior mesenteric artery originated from the aorta and then followed a path to the right side (Figure 5a and 5b).

It should be noted that there was neither dextrocardia nor situs inversus.

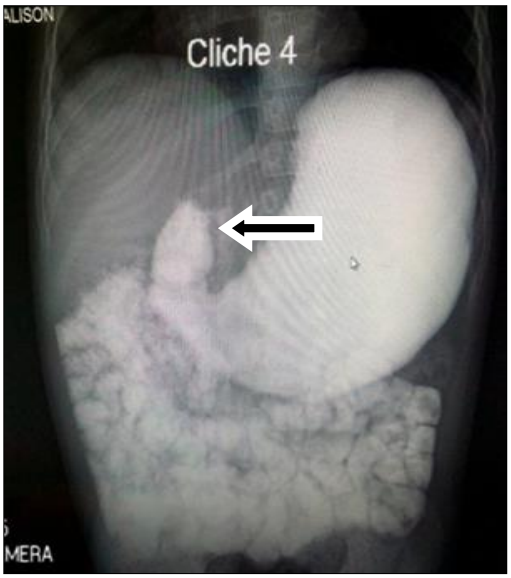
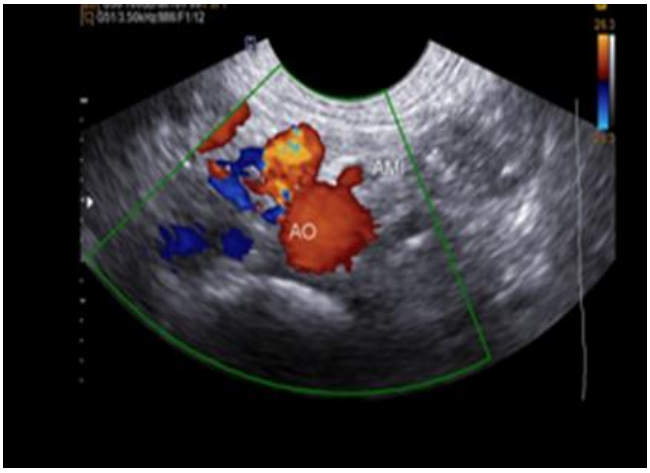



**Fig 1**: UGD showing Treitz angle on the right side of the spine and gastro-duodenal distension

**Fig 2:** Opaque enema showing the position of the sigmoid and descending colon in the right lumbar fossa

**Fig 3:** Position of the transverse colon

**Fig 4:** Subhepatic position of the cecum



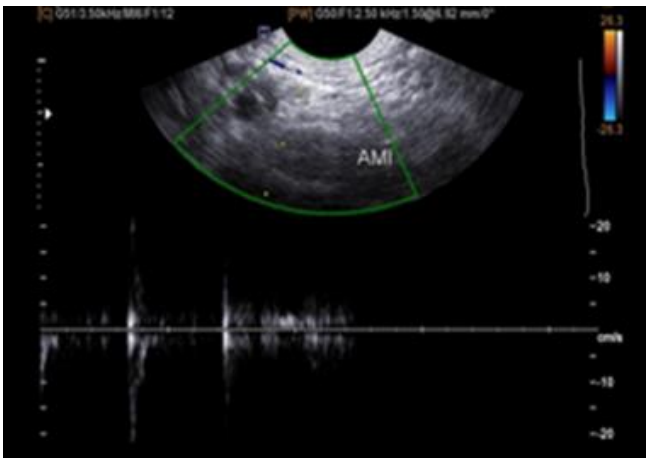




**Fig 5:** Ultrasonographic images showing the onset of the inferior mesenteric artery (5a) and its movement to the right side (5b)

## Discussion

The development of the intestinal tract is a complex process. Indeed, during embryogenesis, the primitive intestine is located outside the abdominal cavity and located in the umbilical cord. Between 5$^{th}$ and 10$^{th}$ weeks, it is reintegrated into the abdominal cavity and at the same time undergoes a 270-degree counterclockwise rotation [4]. This rotation is theoretically divided into 3 stages [5]:

**Stage 1**
Physiologic umbilical hernia at 5-10 weeks. At 6th weeks, the herniated bowel rotates 90° counterclockwise around the superior mesenteric artery.

**Stage 2**
There is a reduction of the midgut hernia in the abdomen at 11th weeks with a 180° counterclockwise rotation, so that the duodenum passes below and behind the superior mesenteric artery. The colon goes in front of the superior mesenteric artery with the cecum located on the right and in a subhepatic position.

**Stage 3**
The subhepatic cecum descends into the right iliac fossa of the abdomen at 12th weeks, forming an ascending colon and attaching the intestine to the posterior abdominal wall.

Interruption of this physiological process leads to intestinal malrotations [3, 4].
In the neonatal period, malrotation may be associated with other congenital malformations (laparoschisis, omphalocele or diaphragmatic hernia) in about 50% of cases [6]. However, it is isolated in the forms of late discovery [7]. Malrotation is asymptomatic for a long time in adults and older children and the diagnosis is made long after childhood [8].
The clinical presentation of intestinal malrotation in older children and adults is less specific than in pediatric patients. This can make diagnosis more difficult; therefore, a good knowledge of anatomical variants is essential. In contrast to the pediatric age group who present with bilious vomiting, adults may present with vague, intermittent abdominal pain and malabsorption [9]. Our case presented with intermittent diffuse abdominal pain and chronic constipation.
Most of the cases reported in history are diagnosed on cross-sectional imaging, but this case was diagnosed on special examinations including UGD and opaque enema complemented by ultrasound of the mesenteric vessels.
The sigmoid colon and descending colon projected from the right iliac fossa and right lumbar fossa with the inferior mesenteric artery having a right-sided course. This corroborates with data in existing research recorded [9, 10].
However, the cecum was visible under the liver and behind the left colonic angle. PRAVEEN reported a similar case but with an associated colonic obstruction [11]. Other literatures have reported different cases where the cecum is visible opposite the right iliac fossa [9, 10], or even in the left upper quadrant of the abdomen where a colonic occlusion by Ladd's band was associated [12].
Intestinal malrotation frequently presents with small bowel obstruction secondary to Ladd's rings or volvulus [11] or both at the same time [13]. This occlusion may be chronic with symptomatology dominated by recurrent abdominal pain associated with food intolerance and constipation [13]. In our context, there was diffuse and intense abdominal pain associated with vomiting whenever the child was overfed, followed by loss of consciousness probably due to vagal shock. Although our patient did not have a clear contrast arrest on UGD, there was still gastroduodenal dilatation and the Treitz angle was located to the right of the spine. In addition, the cecum was in a subhepatic position, it is an anomaly occurs in stage 3 associated with unattached duodenum, and mobile cecum [14]. That could cause Ladd's flanges or a volvulus by short mesentery, leading to a chronic intermittent occlusion secondary to a low-grade obstruction causing incomplete luminal compression, source of intermittent episodes of pain and vomiting [11]. This makes us think of a chronic intermittent small bowel obstruction. Taking into account that our patient did not have the benefit of cross-sectional imaging or surgery, and was subsequently lost to follow-up, we cannot confirm the exact cause of this chronic obstruction.
Consequently, it is important to point out this rare anatomical variant not only the isolated malrotation of the colon but especially the malposition of the cecum which can be a source of intestinal obstruction as described in the relevant documentation [11, 12].

**Conclusion**
Isolated malrotation of the colon, although a rare entity, should be reported whenever it is found. Not only the malposition of the descending colon but also the position of the cecum and the study of the corresponding mesenteric vessels should be noted.

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